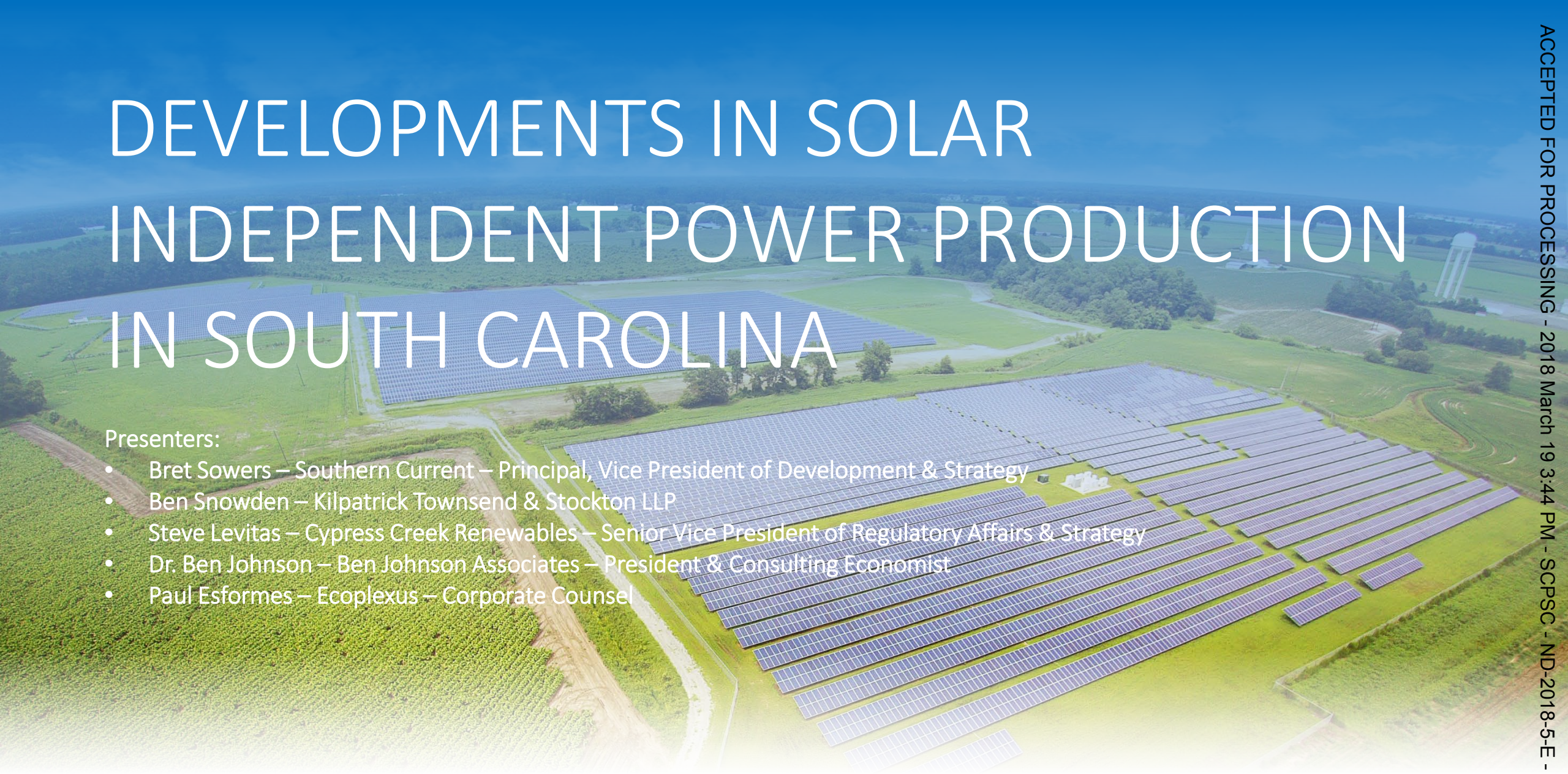
DEVELOPMENTS IN SOLAR INDEPENDENT POWER PRODUCTION IN SOUTH CAROLINA



Presenters:

- Bret Sowers – Southern Current – Principal, Vice President of Development & Strategy
- Ben Snowden – Kilpatrick Townsend & Stockton LLP
- Steve Levitas – Cypress Creek Renewables – Senior Vice President of Regulatory Affairs & Strategy
- Dr. Ben Johnson – Ben Johnson Associates – President & Consulting Economist
- Paul Esformes – Ecoplexus – Corporate Counsel

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BRET SOWERS

PRINCIPAL, VICE PRESIDENT OF DEVELOPMENT & STRATEGY

SOUTHERN CURRENT

COMBINED EXPERIENCE & GEOGRAPHICAL FOOTPRINT

POLICY, REGULATORY, TECHNICAL, AND LOCAL EXPERIENCE IN MULTIPLE STATE MARKETS

- 7 energy companies here today
- 31 states
- Operating & development assets
- Regulated & deregulated markets

SOUTH CAROLINA LARGE-SCALE SOLAR ECONOMIC BENEFITS

TOTAL PLANNED INVESTMENT (approx)	JOB WAGES (approx)	PROPERTY TAX REVENUE (approx)
$ 5.2 BILLION	$780 MILLION	$26 MILLION/YEAR

RATE STABILITY
to ratepayers through fixed long-term, low-cost power purchase agreements

CONSTRUCTION & FINANCE RISK
borne by solar independent power producers

CHARITABLE CONTRIBUTIONS
in local communities in which our companies develop and own assets

GRID IMPROVEMENTS & MODERNIZATION COSTS
borne by solar independent power producers

BEN SNOWDEN

KILPATRICK TOWNSEND & STOCKTON LLP

INTERCONNECTION

ISSUES FOR LARGE-SCALE SOLAR GENERATORS IN SOUTH CAROLINA

- Interconnection of PURPA projects in state-jurisdictional
- For large-scale solar generators, interconnection is typically the longest part of the development cycle
- Interconnection delay and uncertainty is one of the primary impediments to project development

INTERCONNECTION
DELAYS AND QUEUE STATUS

- Backlogs and study times have not improved
- Only a relatively small number of projects have interconnected
- Extensive delays can result in projects losing PURPA rights

INTERCONNECTION
TECHNICAL SCREENS & STUDY METHODS

- SC Generator Interconnection Procedures (SCGIP) require study of "electric system impacts" that would result from the project being interconnected as proposed
- Additional study requirements can greatly increase study times and expense of interconnection
- Application of new screens or study requirements to projects in the queue causes uncertainty and makes backlogs worse
- A more transparent, collaborative approach would build trust and foster innovation

NC COMPETITIVE PROCUREMENT OF RENEWABLE ENERGY (CPRE) PROGRAM

- Mandated for Duke Energy by N.C. HB 589 (2017), but projects in South Carolina may bid and win
- Duke Energy must procure 2,660 MW of renewable energy over the next four years
- South Carolina solar developers still have questions and concerns
- Implementation of CPRE must not negatively impact projects already under development in South Carolina

DR. BEN JOHNSON

PRESIDENT & CONSULTING ECONOMIST

BEN JOHNSON & ASSOCIATES

RATES & IMPROVEMENTS

- QF rates and tariffs

RATES & IMPROVEMENTS

- PURPA avoided cost methodology remains valid but,
- Updates and improvements are needed

RATES & IMPROVEMENTS

WHY ARE UPDATES AND IMPROVEMENTS NEEDED?

- Changing industry conditions
- Growing importance of solar
- Technological changes like solar + storage
- Retirement of older, costly generators

RATES & IMPROVEMENTS

WHAT UPDATES AND IMPROVEMENTS ARE NEEDED?

- QF rates should to be more granular
- Avoided cost rates should be more precise

RATES & IMPROVEMENTS

QF RATES SHOULD ACCURATELY REFLECT SUBTLE NUANCES

- Hour by hour differences in avoided cost
- Weather related differences in fuel costs, solar output
- Optimal response to coal ramping problems
- Optimal use of existing pumped storage
- Correct evaluation of opportunities in wholesale markets

RATES & IMPROVEMENTS

NEXT STEPS

- The need for updates and improvements is real
- Solar industry wants to help
- Process should be open, transparent, and collaborative
- Statewide effort including all interested parties

PAUL ESFORMES

CORPORATE COUNSEL

ECOPLEXUS

PPA ISSUES

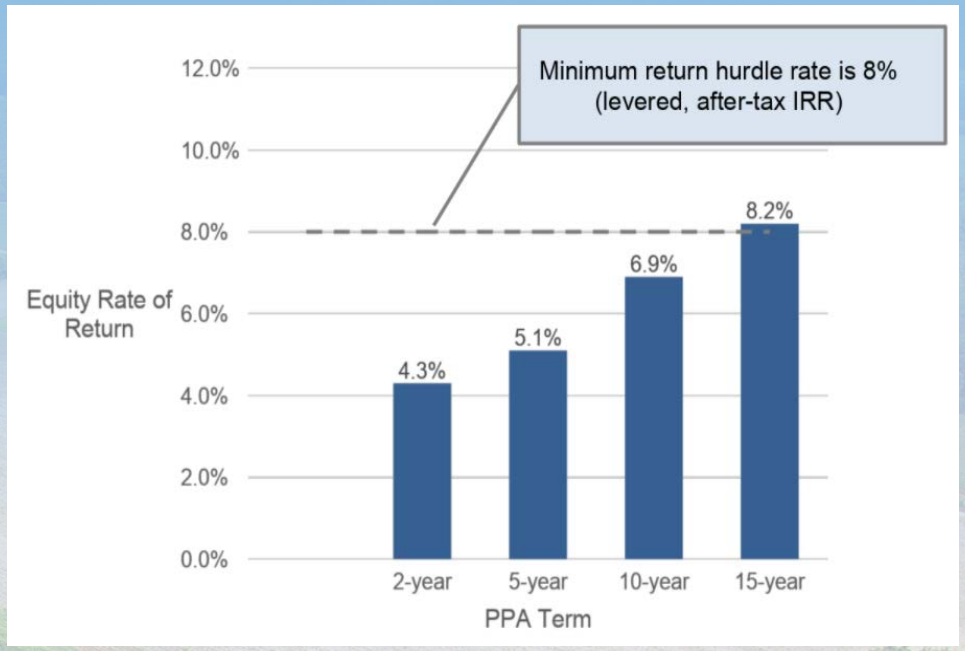
CONTRACT TERM IS CRITICAL TO FINANCEABLITY

Most renewable projects financed with debt financing

Longer term loans enable developers to pay off debt and interest while covering O&M costs

Longer term contracts can be financed with less expensive debt

Contract term ≥15 years generally necessary for a financeable project



Longer Term PPAs Are the Industry Standard

- Ecoplexus' average PPA term for ~75 financed projects in five states (CA, NC, GA, CO, MN) is ~23 years
- Only a small fraction of projects nationwide have PPA terms ≤10 years; vast majority ≥15 years

PPA ISSUES

LONGER TERM PPAs BENEFIT RATEPAYERS

Utilities claim longer term PPAs expose ratepayers to risk that energy prices may go down in the future

- Ignores possibility of price increases or volatility
- Longer term contracts dampen impacts of price volatility
- PPA prices, by definition, are cost-effective – at or below avoided cost

GREEN TARIFF
CONSUMER CHOICE

- "Green Tariff" or "Green Source Rider" allows customers to choose a rate for renewable energy purchased through utility and renewable energy provider
- Typical customers are large C&I customers with clean energy requirements (Fortune 500, Universities, Military)
- Does not have to be exclusive to large customers

BENEFITS

- "ABOVE AND BEYOND"

Supports customers' demand for more clean energy

- PRESERVES UTILITY RELATIONSHIP

Uses utility expertise, purchasing power, and existing billing structure. Doesn't require individual customers to source energy themselves or buy directly from markets

- RATE BASED

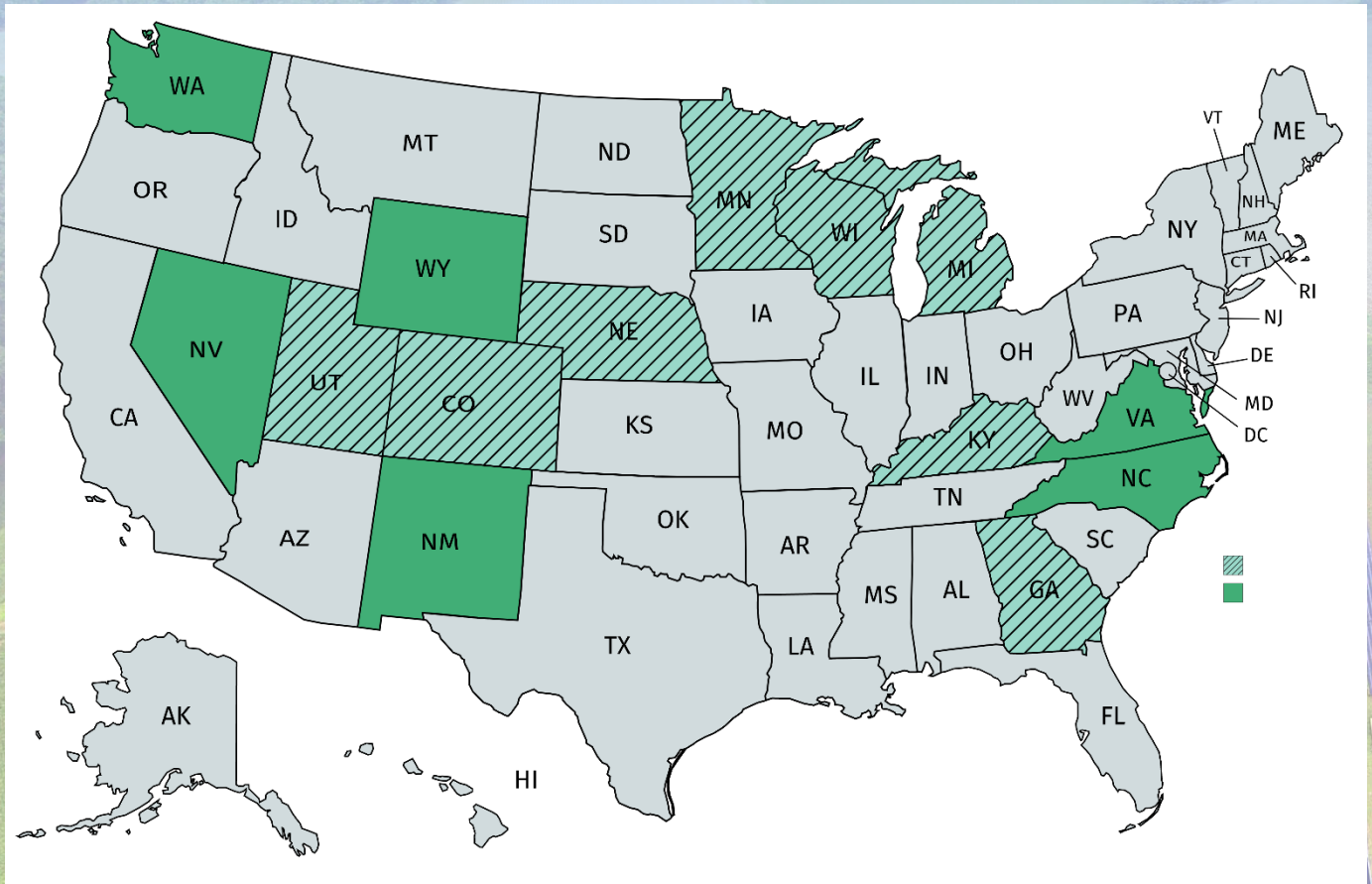
Straightforward pricing without upfront commitment

- COST ALLOCATION

Costs borne by participating customers only; no cost-shift to non-participating customers

GREEN TARIFF

OFFERED BY UTILITIES IN 15 STATES[1]



Implemented and PPAs signed

Implemented and no PPAs signed to dated

1. Source: World Resources Institute, “Emerging Green Tariffs in U.S. Regulated Electricity Markets,” Updated February 2018, p.5.

ENERGY STORAGE

- ENERGY STORAGE = A SYSTEM THAT STORES ENERGY FOR USE AT A LATER TIME
- TECHNOLOGIES: SOLID WASTE BATTERIES, FLOW BATTERIES, FLYWHEELS, COMPRESSED AIR ENERGY STORAGE, THERMAL, PUMPED HYDRO

Potential Uses

- Demand charge management
- Time-of-Use pricing
- Distributed energy resource (DER) management
- Backup power
- Microgrids
- Voltage support and control
- Transmission/distribution investment deferral
- Transmission congestion relief
- Frequency regulation
- Flexible ramping

Challenges

Technical

- Storage capacity
- Granular data
- Real-time feedback

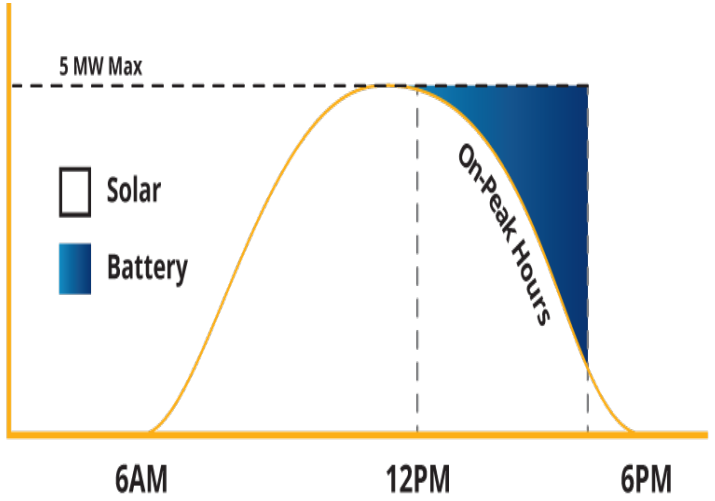
Economic

- System cost
- Financial incentives or ownership options

Regulatory

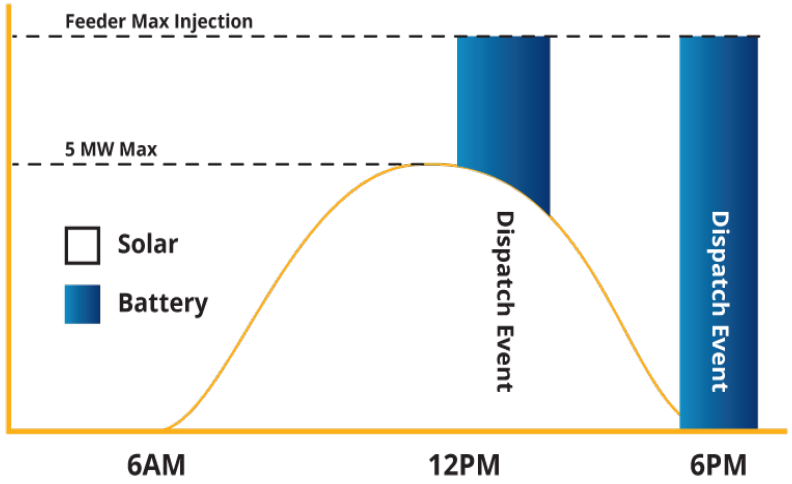
- Rate design (TOU, demand charge)
- Price signals for ES services
- Interconnection

SOLAR + STORAGE



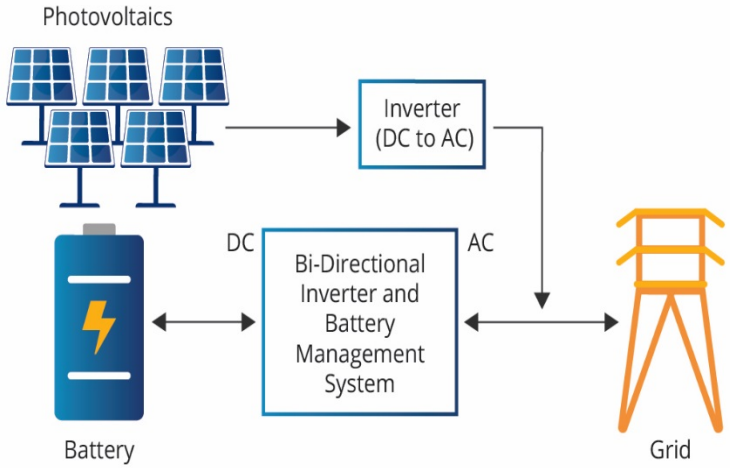
Demand Matching

Storage charges from solar during "low-value" hours and discharges during "high-value" hours. Increases production factor during pre-set hours to 95%+.



Peak Reduction

During peak events, the battery storage system can ramp up in minutes and delivers firm production to local system.



Frequency Management

PV and Storage coupled behind a common point of delivery. The combined power will be limited by max injection controls.

ENERGY STORAGE

- Rapid growth – annual installations grew from 340 MW in 2012 & 2013 to 6 GW in 2017. Projected to reach 40 GW by 2022
- Adoption driven by declining technological costs, state policy and regulations.
- Recent FERC Order 841 removes barriers for wholesale markets
- 32 States took action on energy storage in 2017
  - STUDIES
  - PLANNING PROCESS
  - MANDATES
  - INTERCONNECTION RULES
  - RATE DESIGN
  - FINANCIAL INCENTIVES

STEVE LEVITAS

SENIOR VICE PRESIDENT OF REGULATORY AFFAIRS & STRATEGY

CYPRESS CREEK RENEWABLES

PENDING LEGISLATION

S.890/H.4796

PROCESS & METHODOLOGY IMPROVEMENTS:

- Biennial PURPA proceedings to establish avoided cost methodology and rates, and standard offer terms and conditions
- Bi-annual updates of avoided cost inputs subject to third-party participation and PSC approval
- Non-standard offer rates based on same methodology and subject to PSC approval

PROVIDING REASONABLE TERMS:

- PSC approval of commercially reasonable terms and conditions for all PURPA PPAs
- 15-year fixed price PPAs for all QFs

ENSURING NON-DISCRIMINATORY TREATMENT:

- No curtailment of QFs except as allowed by PURPA
- QF can’t be held responsible for utility interconnection delays
- Avoided cost rates can’t be reduced due to intermittent nature of renewable resource

PENDING LEGISLATION

S.987/H.5001

SUMMARY OF KEY PROVISIONS:

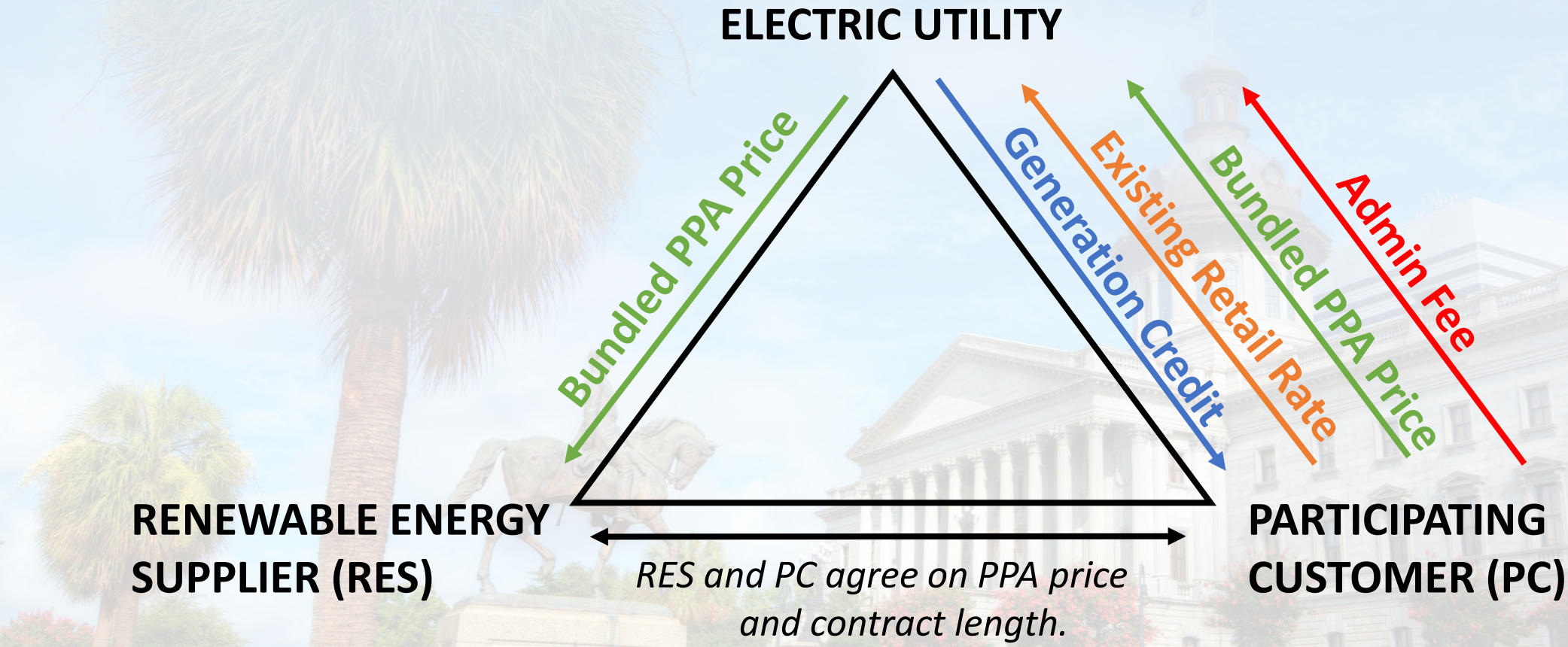
- Electrical utilities required to file “green source” programs for PSC approval
- Participating customers (PCs) have right to select renewable energy facility from which utility will procure energy, capacity, & environmental attributes on behalf of PC and to negotiate PPA price and term RE supplier (RES).
- Electrical utility will enter into PPA with RES to purchase energy, capacity, and environmental attributes for the benefit of PC. RES and PC enter into renewable energy contract (REC) re purchase price and the contract length.
- REC, PPA, and PC agreement of equal duration, ranging between two years and twenty years, as agreed to by PC and RES.
- In addition to paying its existing retail bill, reduced by amount of generation credit based on avoided costs, PC will reimburse electrical utility on a monthly basis for amount paid by utility to RES, plus admin fee <= $500 per month.

ADDITIONAL PROVISIONS:

- Each utility's program includes standard terms & conditions for PC agreement & PPA, subject to PSC review/approval.
- Utility not liable for costs related to PC or RES default.
- Utility may not charge non-participating customers for any direct costs incurred pursuant to program.
- PC eligible to procure amount of energy equal to 125% of most recent annual energy usage.
- Utility complies until aggregated amount of procured capacity equals 10% of previous 5-yr avg of utility’s SC retail peak demand.

PENDING LEGISLATION

S.987/H.5001



THANK YOU

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